FINANCIAL DEREGULATION AND THE BANK LENDING CHANNEL IN DEVELOPING COUNTRIES: THE CASE OF INDONESIA *)

*Juda Agung**)*

The dominant role of commercial banks as a source of finance and the considerable asymmetry of information in financial markets in developing countries have raised an argument that the bank lending channel of monetary transmission mechanism would be very important in such countries. This study addresses the issue by investigating empirically whether there are differential effects of monetary policy on banks' balance sheets, and its implications to the existence of the bank lending channel of monetary policy in Indonesia, especially since the early 1980s when the government adopted a policy of financial deveculation. We find significant differences of balance sheet behavior across bank clashes in response to a change in monetary policy, consistent with the predictions of the bank lending view. We also found that because of access to foreign funds and the existence of bank loan commitment, the monetary policy was unable to constrain loan supply by the large (state) banks, indicating that the bank lending channel operates through smaller (non-state) banks.

I. Introduction

*F*or the past ten years, there have been voluminous studies on the so-called 'bank lending/credit channel' of monetary transmission mechanism[1]. These studies have been motivated by the growing literature on as ymmetric information in Financial markets and also by the fact that large fluctuations in the aggregate economy are often generated from an apparently small shock, a phenomenon conjectured by Bernanke, Gertler and Gilchrist (1996) as a result of the existence of the "financial accelerator".

According to this view,[2] the role of banks in the transmission of monetary policy relates to both their liabilities and assets. In a monetary contraction, bank reserve decrease and owing to reserve requirements, bank deposits fall. If the decrease in bank deposits is not offset by other funds which are not subject to reserve requirements, or decrease in securities, this will result in a decrease in bank loans. If bank loans fall and bank-dependent borrowers are dominant in the economy, the monetary policy reduces both investment and economic activity. Hence, monetary policy *not only* directly influences the *real interest rate* but also directly affects the *supply of bank loans.* Thus, two necessary conditions for the existence of this channel are: (1) bank loans and securities must be an imperfect substitute for some borrowers, or some borrowers are bank-dependent; (2) central bank must constrain the supply of bank loans.

Since asymmetric information seems to be prevalent in the financial markets of the developing countries,[3] some, if not most, classes of borrowers find it difficult to issue securities. As a result of the predominant role of banks in developing countries and their ability to overcome the information problem in credit markets, many borrowers are substantially bank-dependent.[4] This is why Stiglitz (1994) suggest that 'LDCs must expect that firms within their economies will have to rely heavily on bank lending, rather than securities markets, as a source of fund.' To sum up, the first condition of the bank lending channel is likely to be satisfied in developing countries.

Nevertheless, as a result of the ongoing process of financial liberalization, which has altered the structure of financial markets, doubts have been raised about the importance of

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[1] For a comprehensive survey on this topics, see Hubbard (1995), Ceccheti (1995) and Peek and Rosengren (1995). Many authors distinguish the 'credit channel' into the bank lending channel and the balance sheet channel.

[2] See Bernanke and Blinder (1998).

[3] For example, poor accounting disclosure, lack of credit rating agency.

[4] Even in the countries like the US where financial markets has been well established, the number of bank-dependent borrowers is subtantial (see Himmelberg and Morgan, 1995).

the bank lending view (Thornton (1994) and Meltzer (1995) among others). The reason for this is that financial deregulation and innovation have widened the menu of financial options available to firms, reducing their dependency on bank loans. Although such doubt is based on the US and other developed countries, some studies suggest that it might also be applicable to developing countries. A survey of corporate financing in developing countries conducted by Glenn and Pinto (1994) indicates a shift away from bank loan finance to equity finance at the margin. Furthermore, a study of the capital structure of Indonesian firms by Ang et al. (1997) suggest that at least for long maturity finance, the (large) firms prefer new stock issuance to long-run bank loans.

The second condition for the bank lending channel is questionable on empirical grounds, that is, whatever monetary policy can significantly influence the supply of bank loans. In order to limit the ability of banks to extend their loans after monetary contraction, bank must not easily be able to issue other forms of liabilities to replace lost deposits. Some argue that the central bank has tended to be less able to completely constrain the banks' liabilities and thus bank loans since bank can issue instruments which are not subject to the reserve requirement.[5] In the Indonesian case, we can observe that recent developments in funding for financial intermediaries, particularly commercial banks, have been such as to reduce their reliance on deposits. Recent developments suggest that the non-deposit sources of bank finance have increased dramatically in the form of foreign borrowing, international bonds and commercial papers (Folkerts-Landau et al., 1995). In addition to this, an increase in the use of loan commitments could reduce the role of the bank lending channel or at least it could lengthen the monetary policy lags. Overall, the potential effects of financial deregulation on both firms and banks are a weakening of the bank lending channel.

This study evaluates the second condition of the bank lending channel in developing countries, using Indonesian data especially after financial deregulation. Following kashyap and stein (1995), it attempts to investigate the responses of bank balance sheet variables (deposits, loans and securities) of different classes of banks, i.e., large banks which are supposed to have access to non-deposit source of finance after a monetary contraction, and small banks whose balance sheets can easily be constrained by the monetary policy innovation. This is in line with previous studies conducted as part of continuing efforts to resolve identification problems in the bank lending channel research agenda (Gertler and Gilchrist, 1994; Kashyap and Stein 1995, 1997). Bank categories are differentiated on the basis of their size and their access to foreign source of funds: state banks,[6] private foreign exchange licensed

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5 See, for example, Romer and Romer (1990).
6 The state banks are large banks and have access to foreign sources of funds.

banks and non-foreign exchange banks. This approach is to address the question of whether monetary restrictions can constrain bank loan supply and whether they have differential effects on bank balance sheet components across different classes of lenders. Furthermore, the study investigates the effects of monetary policy on the behavior of investment, working capital and consumer loans across the bank - size categories. This heterogeneity of the loan types which could reflect the loan size and type of borrowers (consumer vs non-consumer) would help to shed light on the existence of the bank lending channel.[7]

The paper is organized as follows. Chapter II discuss the implications of financial deregulation on bank behavior and changes in the conduct of monetary policy. Chapter III presents the empirical issues and sources of data. Chapter IV reports on the empirical results for Indonesia. Finally, conclusions and a future research agenda are presented in Chapter V.

II. Financial Deregulation, Bank Behavior and Monetary Policy.

II.1.   Behavior of Commercial Banks

At least three major financial reforms have influenced the development of commercial banks in Indonesia:[8] (1) the 1983 financial reform that abolished credit and interest-rate ceilings; (2) the 1988 financial reform package (PAKTO); and (3) the 1991 financial reform to re-regulate banking sectors by introducing some prudential regulations. Banking activity, as reflected by total assets of the commercial banks, has increased very rapidly since the launch of PAKTO in October 1988 when market entry to the sector was liberalized. As shown in Table 1, the asset side of commercial banks' balance sheets has been dominated by loans and foreign assets. The share of loans (including loans in foreign currencies) grew substantially from 63.4% in 1983 to 82.09% in 1991 as a result of 1983 and 1998 financial deregulation and has been levelling off after periods of consolidation in banking sectors in response to various strict prudential regulations. It can also be seen that the share of foreign assets and the liquid assets in commercial banks' balance sheets decreased significantly over time. The decline in the growth of foreign assets resulted from a relatively high return on domestic assets after removal of the ceiling on domestic interest rates in 1983, while the drop in the share of liquid assets could be attributable to the substantial reduction in the reserve requirement ratio from 15% to 2% in October 1988.

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7 Ideally we should divide borrowers into small and large firms. Such data were not, however, available until March 1994.

8 For thorough survey on Indonesian financial development, see Cole and Slade (1996). McLeod (1994) and Marshall (1994).

On the liability side, prior to 1983, source of funds for Indonesian banks were mainly Rupiah deposits and borrowing from Bank Indonesia through the central bank's lending scheme to some priority industries. The removal of credit and interest-rate ceilings spurred commercial banks to compete for funds. Domestic deposits also became competitive with dollar deposits which resulted in an increase in saving deposits can also be observe in the commercial banks' balance sheets after the authorities launched the 1988 financial deregulation. The increase in deposits of this type was due partly to differential tax treatments in favor of savings deposits and partly to the removal of restrictions on saving schemes (Marshall, 1994).

After the ceiling on foreign commercial borrowing by banks was abolished and swap facilities with the central bank were instituted in 1989, off-shore funds such as foreign borrowing provided a new source of funds for the commercial banks. This is reflected by a marked increase in the share of foreign liabilities in the commercial banks' balance sheets, from 12.14% in 1988 to 20.88% in 1991. The Indonesian banks, especially large ones, became very active in raising funds from abroad through commercial bank lending to generate the funds needed by their clients. Inadequate information makes it difficult for nonbank firms to raise funds in the international market, except the few large companies owned by conglomerates and big state enterprises. By contrast, the large commercial banks with foreign branch are able to offer international lenders credible information and thus are able to access

Table 1
Balance Sheets of Indonesian Commercial Banks
(End of the Year Position)

	1983		1988		1991		1995	
	billion rupiah	%	billion rupiah	%	billion rupiah	%	billion rupiah	%
Assets:								
Liquid assets	1,569	7.53	1,830	2.89	2,943	1.92	5,140	1.67
Total loans *	13,208	63.4	46,340	73.23	125,790	82.09	259,027	83.93
Foreign assets	4,520	21.7	8,397	13.27	11,072	7.23	17,096	5.54
Others	1,535	7.37	6,717	10.61	13,434	8.77	27,355	8.86
Assets = liabilities	20,832	100	63,284	100	153,239	100	308,618	100
Liabilities:								
Domestic deposits:	9,649	46.32	31,198	49.3	74,871	48.86	171,827	55.68
Bank Indonesia	4,264	20.47	10,812	17.08	11,692	7.63	10,395	3.37
Foreign liabilities	3,257	15.63	7,683	12.14	31,999	20.88	65,994	21.38
- FX deposits	2,289	10.99	1,159	1.83	11,935	7.79	26,042	8.44
- Non-deposits								
FX liabilities	968	4.65	6,524	10.31	20,064	13.09	39,952	12.95
Capital	1,630	7.82	4,464	7.05	10,166	6.63	30,111	9.76
Others	2,032	9.75	9,127	14.42	24,511	16	30,291	9.82

Note: * including loans in foreign currencies
Source: Indonesian Financial statistics, Bank Indonesia (various issues)

external funds at a lower cost than their borrowers. In addition to direct borrowing from foreign commercial banks, Indonesian banks have been very active as issuers of bonds and other debt in international markets, especially since the early 1990s (Folkerts-landau et al., 1995). The active role of large banks as intermediaries in providing foreign funds was partly encouraged by the relatively stable exchange rate which allowed banks to take advantage of the interest differential between domestic and US dollar interest rates.[9] This behavior was evident in the periods of high domestic interest rates in 1991-1992. In this period, the large foreign-exchange banks, including state banks, turned to foreign sources of non-deposit funds in response to tight money condition in the domestic economy. The possible implication of this behavior is that the monetary policy contractions could be offset by this behavior of the large commercial banks, and this is one subject of the empirical investigation.

II.2. Changes in The Conduct of Monetary Policy

Over the years there have been changes in the implementation of monetary policy. Soon after the credit ceiling and interest rate control were removed, the central bank adopted interest targeting to reduce possible interest-rate volatility and the unacceptably high levels of interest-rates that is was believed would arise were monetary targeting to be adopted under such financial liberalization. However, after the speculative pressure on the rupiah in mid-1987, the policy shifted to protecting the level of international reserves (Sundararajan and Molho, 1988). In the immediate past the policy makers seem to have turned towards the use of more electric targets (Boediono, 1994).

To conduct day-to-day monetary control operations, after removing direct monetary control through credit and interest ceilings, Bank Indonesia introduced new money market instruments; SBI (Bank Indonesia Certificates) and SPBU (Money Markets securities, issued or endorsed by banks). SBIs are issued when the central bank wants to squeeze liquidity, while SPBUs will be purchased by the central bank in order to increase the liquidity of the system. These instruments are needed to conduct indirect monetary operations since the government does not issue Treasury bills used in many countries as the basis of open market operations and repo policies. Besides as instruments of open market operation, the SBIs can be used to manage the sort-term liquidity of banks, firms and individuals.

Moreover, sometimes SBIs have been used as an alternative investment. When SBIs

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9 This low risk tempted domestic borrowers not to hedge their foreign borrowings as was the problem under the recent currency turmoil.

were introduced the auction of the instruments was conducted by a 'cut-off rate' (COR) system; wherein Bank Indonesia sets the COR-SBI rates (prices) and the market determines the quantity of SBIs traded. However, since June 1993, in order to keep SBI rates reflecting market conditions, the auction system has been replaced by the 'stop-off-rate' (SOR) system. In the latter, the quantity is set by Bank Indonesia and market forces are allowed to determine SBI rates. In the early years, the market for SBIs was very thin and most SBI outstanding was held by state banks. As a result, the authority found difficulty in controlling the liquidity of the economy using the instruments indirectly.[10] The volume of SBIs is now large enough to enable the central bank to utilize them to conduct open market operation more effectively.

In the course of the 1998-financial deregulation the reserve requirement was reduced from 15% to 2%. This indirect instrument of monetary control was not employed again until December 1995 when the requirement was increased to 3%. Recently, September 1996, Bank Indonesia announced that the ratio would be increased to 5% effective on 16 April 1997. In contrast with previous reserve requirements, the last two provisions are more restrictive in the sense that all fund components in the bank liabilities are subject to the reserve requirement, including demand deposits, time deposits, saving deposits and other liabilities, irrespective of the term of maturity. In the old provision, the latter component included only liabilities with a maturity of less than 24 months. The re-utilization of the reserve requirement as an indirect instrument of monetary policy is intended to control bank credit in the light of the surge in capital inflows explicitly reported in the Bank Indonesia Annual Report: '...minimum reserve ...can be applied to curb the growth of money supply (M2), particularly bank credit' (Bank Indonesia, 1996, p. 18). In addition, the new provision will strengthen the power of monetary policy to influence the banks' balance sheets.

Another recent bank regulation which is relevant to this discussion is the new imposition of CAR to the foreign-exchange banks. To enhance bank prudence in expanding lending activities and increase competitiveness, Bank Indonesia *required foreign-exchange banks*[11] to increase their CAR in phases up to 12% within six years from September 1995. This regulation is also aimed at controlling the expansion of bank credit that has resulted recently from large capital inflows.

III. Methodological Issues

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10 For example, in September 1984, the interbank overnight rate reached 90% per annum when the economy experienced a liquidity squeeze. On other occasions to counteract speculation about changes in the foreign-exchange rate in the second quarter of 1987, the authorities took drastic measures to force the reduction in bank reserves by requiring state banks to purchase SPBUs and instructing state enterprises to use their deposits to buy SBIs. A similar case occurred in early 1991. These massive transfers of funds from state-owned banks to the central bank are known as the "Sumarlin Shock" (after the former Minister of Finance who instructed them).

11 Foreign-exchange banks are defined as domestic and foreign banks that are licensed to engage in foreign exchange transactions.

III.1. Aggregate vs Disaggregate Data.

Most earlier studies on the bank lending channel have been conducted by the use of *aggregate* data comparing the relationship between total bank loans versus the total deposits and the economic variables in the context of vector auto-regression (see Bernanke and Blinder (1992) and Callen and Reynolds (1996) for Thai and Malaysian economies) or the relative forecasting power of the two aggregates with respect to output fluctuations (Ramey (1993)) among others). However, it is now widely agreed that testing with aggregate data can generate a misleading conclusion. First, the use of aggregate time series can not resolve the well known identification problem. i.e. to distinguish whether the credit contraction which typically follows the monetary tightening is a result of the *supply* by banks, as argued by the bank lending channel, or the fall in *demand* for bank loans stemming from a recession. Second, testing the relative importance of the bank lending vs money view by comparing the information content of these two aggregates with respect to output would be misleading (Bernanke, 1993). Because of bank balance sheet constraints, *aggregate* money supply (liability side of banks) and aggregate bank loans (asset side of banks) by construction, move together although they are not identical. Thus, the relative forecasting power of these two aggregate variables does not provide any information about monetary transmissions.

To identify the channel of monetary policy, recent studies (Kashyap and stein, 1995, 1997; dale and Haldane, 1994, for example) have tended to use cross chapteral data to determine whether there are distributional effects of monetary policy across lenders and borrowers, as predicted by the bank-lending-channel argument. On the lenders' side, the argument of lending view suggests that monetary policy shock should constrain bank loan supply since banks can not frictionlessly raise non-deposit funds to make up for a shortfall in their deposits. But this will depend on the ability of banks to insulate themselves from the shock. Small banks which have relatively limited access to non-deposit funds such as securities issues or foreign borrowing are expected to be more affected by the monetary shock and tend to cut their loans supplies immediately following the shock. On the borrower side, small firms which have limited access to external finance should be more sensitive to monetary shock (Gertler and Gilchrist, 1994). The use of cross chapteral data, furthermore, eliminates the banks' balance sheet constrains.

This study follows Kashyap and Stein (1995) by disaggregating banks into different

Figure 1
Number of Bank in Sample
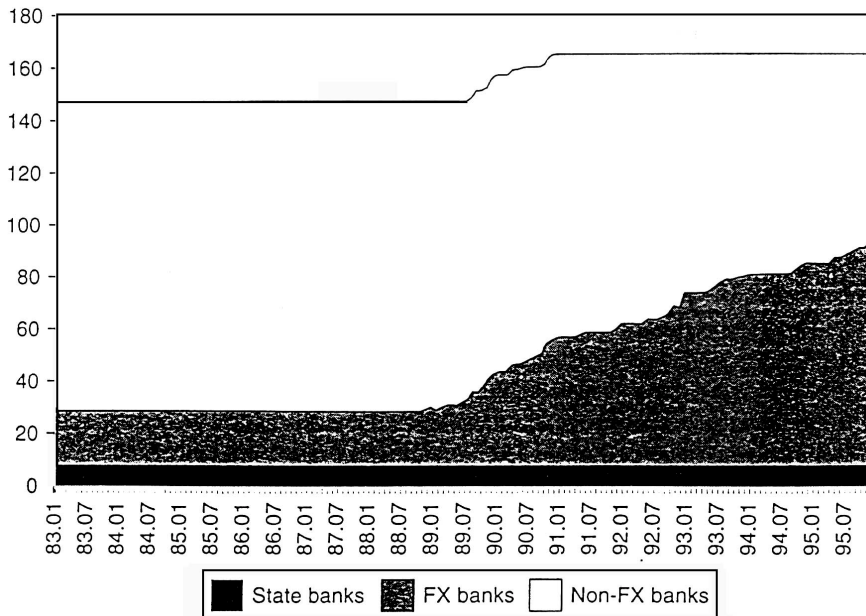
classes, reflecting their size and accessibility to non-deposit funds: *state banks* which are large and foreign-exchange-licensed banks, *private forex licensed banks* comprising domestic and foreign/joint banks, and *private non-forex licensed banks.* We aggregate balance-sheet items from bank-level data taken from *Commercial Bank Monthly Report* collected by Bank Indonesia for regulatory purposes and monetary statistic.[12] By using these data, we can maintain data consistency because since 1992 Bank Indonesia has not published aggregate bank balance sheet data of private forex vs non-forex licensed banks.

We identify all private domestic banks which change their status from a non-forex bank to a forex bank in any two adjacent months and classify them according to their categories. Furthermore, using the bank-level data we were able to identify merger banks and collapsed banks during the sample period of sample and eliminate them. New banks which were established after 1991 were also eliminated since their loan behavior would be biased because of their high liquidity in the early period of operation. For example, the average loans-to-deposits ratio of new banks one year after establishment amounted to 0.53, while that for old

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[12] Disaggregated data into different classes are available to the aouthor, but due to banking secrecy, data on bank-level are confidental.

banks amounted to 0.95. Figure 1 presents the number of sample banks in each category over the sample period January 1983 to December 1995.

The data for each class of banks include bank loans, deposits, non-de-posit funds and securities holdings. Bank loans consist of loans extended in domestic and foreign currency, The loans are also disaggregated into investment, working capital and consumer loans. Securities consist of all securities held by banks both in domestic and foreign currency. Non-deposit funds consist of securities issues, CDs, commercial paper in domestic and foreign currency and direct foreign borrowings. Appendix 1 gives the sources and definitions of data.

III.2. Vector Autoregression Approach

The effects of monetary policy shock on bank balance sheets and economic variables are examined using the vector autoregression (VAR) approach. Specifically, we use the standard semi-structural VAR approach as suggested by Bernanke and Blinder (1992). A VAR is a useful model for studying the dynamics of the economy in the aftermath of a monetary policy shock. A structural VAR model is a linear dynamic system of the following form:

$$\mathbf{B}y_t = \mathbf{C(L)}y_t + \varepsilon_t \quad\text{.. (1)}$$

or in MA form:

$$y_t = \Phi(\mathbf{L}) \varepsilon_t \quad\text{... (2)}$$

where $\Phi(\mathbf{L}) = [B-C(L)]^{-1}$.y is an n x 1 vector of endogenous variables in the system including one policy variable and some non-policy variables ε_t is a vector of structural shocks, including the monetary policy shock. B represents the structural parameters of contemporaneous endogenous variables and C(L) is a kth degree matrix polynomial the lag operator, i.e. $C(L) = C_1 L + C_2 L^2 + ... + C_k L^k$. ε_t is an n x 1 vector of structural shocks with zero mean, orthogonal and variance-covariance matrix $E(\varepsilon_t \varepsilon_t') = I$.

Equation (1) can be written in a reduced form which can be estimated by OLS as:

$$y_t = A(L)y_t + u_t \quad\text{.. (3)}$$

With $E(u_t u_t') = \Omega$. By noting $A(0) = B^{-1}$, from the structural model (1) and the reduced form model (2) we obtain :

$$A(L) = A(0)C(L) \quad\text{... (4)}$$

and,

$$u_t = A(0)\varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (5)$$

Accordingly,

$$E(u_t u_t') = \Omega = A = (0)A(0)^t \dots\dots\dots\dots\dots\dots\dots\dots (6)$$

From (2) we can obtain *impulse-response functions*, $\Phi(L)$, to structural shocks, ε_t and $\Phi(L)$ can be calculated from (3) and (5) :

$$\Phi(\mathbf{L}) = [I-A(L)]^{-1}A(0) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (7)$$

In order to identify the structural model and structural shock, ε_t we have to determine the $n \times n$ elements of matrix $A(0)$. As Ω is known from OLS estimates of (3) we can solve (6) for $A(0)$ and the deduce ε_t from (5). However system (6) only provides $n(n+1)/2$, hence we need $n(n-1)/2$ additional restrictions for the identification. A convenient way is to add the $n(n-1)/2$ restrictions $A(0)$ on lower triangular and use the Cholesky decomposition of the variance-covariance matrix Ω (Sims, 1980). This restriction is equivalent to assuming that the residuals $\mathbf{u}_t$ form a recursive system. The ordering of variables in the system, therefore, affects the recursive chain of causality among the shocks in any given period. The policy variable is placed *first* (for example, Sims, 1992) if we assume that there is no contemporaneous feedback from non policy variables onto the policy variables. Thus, this equivalently assumes that the monetary decisions are made without considering the simultaneous evolution of economic variables. This assumption is plausible if data for non-policy variables are not readily available. If we assume that the policy variable responds to contemporaneous feedback from non policy variables but there is a one-period lag of feedback of the policy shock on non policy variables, the policy variable should be placed at the end. Given the high frequency data (monthly) that we use in constructing VARs, hence the existence of information lag from non-policy variables,[13] we prefer identifying restriction. Nevertheless, as the correlations across residuals (ε_t) are very small, the ordering is actually not significant.[14]

III.3. VAR Specification

In examining the effects of monetary policy on the bank balance sheet, one ideally should include all bank balance sheet components in a VAR, so that the interrelationship between

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[13] For example, interest rate date data (the policy variable) is readily available, while non policy variable such as real output, and price were available at lag.

[14] A rule of thumb is that if $[p_{if}]$ for $i = j$, the ordering of variables in a VAR is not relevant.

the balance sheet components can be evaluated (McMillin, 1996). However, such a specification, which may involve a VAR with many variables, needs a very long sample series. Given the rather limited sample period that we have, we follow Gertler and Gilchrist (1993) and Kashyap and Stein (1995) in specifying the VAR. In the VAR, each balance sheet variable is entered separately in the model. The systems we developed are five-variable VARs with the following ordering: monetary policy indicator, exchange rate, balance sheet variables (deposits, loans and securities), output and prices. Given that the calculated residual correlation of the VARs was very low (not calculated here due to space), the impulse response functions were not sensitive to the ordering (see Enders, 1995).

As far as the monetary indicator is concerned, literature on the identification of monetary shock suggest that there are some alternatives: the interest rate used by the central bank to influence the money market such as the Federal Funds rate in US - an endogenous interbank rate (Bernanke and Blinder, 1992), Romers's dates of monetary tightness (Romer and Romer, 1990), or some aggregates such as total reserve, non-borrowed reserve, (Strongin, 1995; Christiano, Eichenbaum and Evans, 1996). In the case of Indonesia, interest rates of Bank Indonesia certificates (SBI) could be considered the best indicator of monetary policy change. The SBI interest rates are based on a cut-off rate (stop-off rate since 1993) determined by the monetary authority, and they are utilized by the central bank to influence the money market interest rates. Hence, they are an ideal candidate for the policy variable. However, as the market for SBI was very thin especially in the early periods and the interest rates on SBI for a certain maturity were interrupted, we use the one-month interbank interest rates, instead, as an indicator of the stance of monetary policy. The reason is that bank Indonesia often indirectly targets the interbank interest rates and in recent years, the SBI rates have been widely used as the benchmark by market (Bank Indonesia, 1992).[15]

In addition to output measured by real GDP and the prices measured by the consumer index, we incorporate the exchange rate in the VAR. This variable is neglected by many studies such as Bernanke and Blinder (1992) and Kashyap and Stein (1995) and this would be justified for a relatively closed economy like the United States. However, for relatively small and open economies like Indonesia, the exchange rate plays an important role. Innovations in exchange rate affect the economy significantly. The VAR is specified in the following order: interest rates, exchange rate, balance sheet variables, real GDP and consumer price index.

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[15] Callen and Reynolds (1996) also use money market interest rates in studying the transmission mechanism in Malaysia.

All variables are in log levels[16] and were tested for stationarity by Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests. All were found to be I(1) with exception of the money market interest rates.[17] Sims (1980) and Doan (1992) do not recommend differencing the data prior to VAR estimation even if they contain unit roots. Their argument is that differencing in order to assure stationarity will "throw away" valuable information concerning the interrelationships of the variables in the system such as the possibility of a cointegrating relationship. It should be noted that the emphasis of VAR analysis is on tracing the dynamic relationships among a set of interested variables, not the parameter estimates. Therefore, the VARs were estimated with all variables in log levels. This specification is equivalent to an unrestricted vector error correction mechanism (Dale and Haldane, 1994). The lag length on the VAR is determined by the use of Akaike information criterion and misspecification tests such as auto-correlation and normality tests, and it is found that six lags is optimal.

IV. Empirical Results

The aim of this section is to examine the behavior of the bank balance sheet across bank categories and to see whether or not the differential responses to monetary policy shock are in line with those predicted by the bank-lending view of monetary transmission. There are three bank balance sheet items which are considered to have implications for the bank lending channel view: deposits, loans and securities holdings. The sample period of our study (1983:01-1995:12) covers several structural changes in the financial structure of banks and firms and the operation of the monetary policy as a result of the process of financial deregulation, which was adopted by the government in June 1983 and October 1988 (PAKTO), the "big bang" of Indonesian financial deregulation. These structural changes raise the question of the stability of the VARs. Ideally, the sample should be split into two periods, before and after the PAKTO, and the VAR and impulse response functions estimated for the two periods. However, the sample split will result in such small samples that the observation would not be sufficient to estimate VARs. Therefore, we test the stability of the VAR by the Chow-breakpoint test.[18] The Chow test for all VARs indicate that there is no sign of instability

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[16] Interest rates are in the form of $100 \log(1 + r/100)$.

[17] Available upon request.

[18] This is performed by PCfilm version 8.0 (Doornik and Hendry, 1995). The Chow-test results are available upon request.

Figure 2
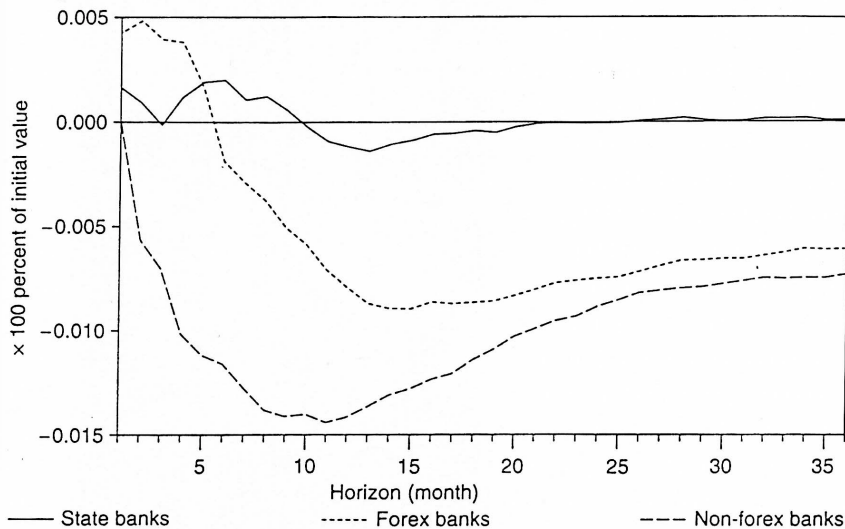**Response of Bank Deposits to a Monetary Shock**
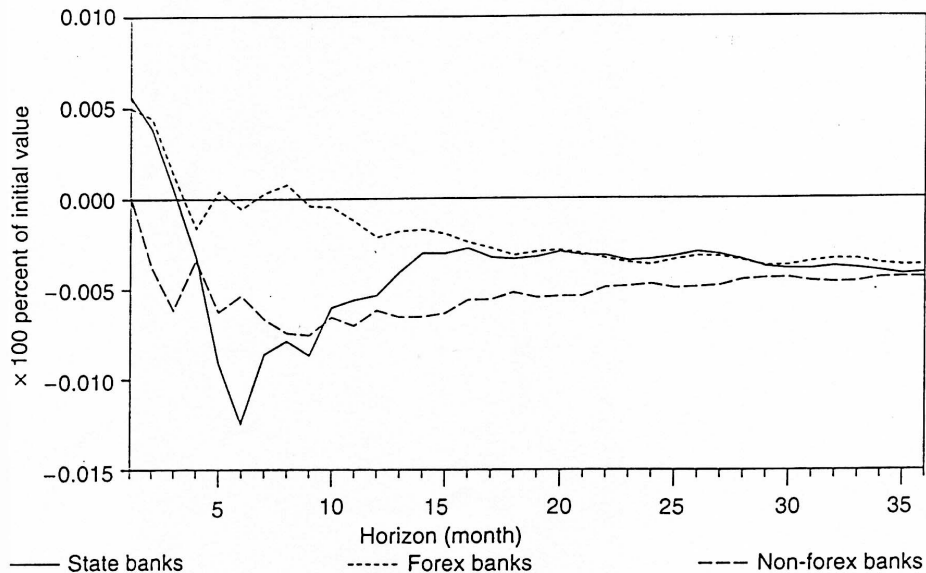
in the VARs.

The bank lending view, like other channels, predicts that a monetary contraction leads to a fall in bank deposit as a result of fall in bank reserves. However, the bank lending view does not predict differential effects of bank deposits across bank sizes. Specifically, the view does *not* predict that small banks' deposits will fall more than those of large banks (Kashyap and Stein, 1995). To test this prediction, we constructed a five-variable VAR including deposits as the balance sheet variable and examined the impulse response function of bank deposits in the aftermath of monetary shock. The bank deposits consist of demand deposits, time deposits and saving deposits in both domestic and foreign currency. All types of bank deposits are subject to homogenous reserve requirements. The impulse-response function over time is presented in Figure 2, demonstrating the timing and magnitude of the bank deposit responses. The result suggest that deposits of all categories of banks fall sharply following a monetary contraction. The initial impact of a monetary shock is an increase in deposits with state and foreign-exchange banks, which could be attributable to a "flight to quality" in response to a

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[19] "Flight to quality" early occurred in the recent currency crisis when depositors moved their deposits to state banks or foreign banks.

Figure 3
Response of Total Lending Volume to a Monetary Shock

monetary shock.[19]

The next and the most crucial investigation on banks' balance sheet behavior is to examine the response of loans across heterogenous banks to a monetary tightening. Figure 3 demonstrates the impulse-response functions of bank loans to the shock. Total loans of state banks are insensitive to monetary shock. It can also be noticed that lending by state banks and forex banks increased in the early period after monetary shock. This behavior is supported by a survey conducted by Hadad (1996). He found that during the tight money period, the majority of state banks and foreign banks experienced "loan growth higher than deposit growth". This could possibly be due to their access to foreign sources of funds or interbank transactions. Figure 3 also suggest that the total loans of non-state bank decline more than those of state banks after the shock. Moreover, the fall in total loans of non-forex banks was quicker and much larger than that of forex banks. Overall, these results confirm our prediction that because of asymmetric information, it is difficult for small banks to raise external finance by issuing non-deposit funds or borrowing abroad to replace the fall in their deposits to continue their lending activities. These results are also consistent with a model of the banks' portfolio response to monetary policy shock developed by Kashyap and Stein (1995) which predicts that total loans of small banks decline more rapidly in response to the shock.

The differential behavior of *total loans* across bank categories may be explained by an alternative interpretation (see, for example, Kashyap and Stein, 1995). The differential responses could be generated by different types of loan advanced by different categories of banks; large banks tend to concentrate on investment loans while small banks tend to concentrate on consumer loans such as housing loans. Since consumer loans are relatively more sensitive to monetary contraction/recession than investment loans, the differential effects of monetary policy on banks could be caused by *loan demand* of different types of loans, rather than by *loan supply*. Therefore, to address this possibility, we disaggregate the total loans into investment loans, working capital loan and consumer loans for all categories of banks. The impulse-response functions of the different types of loan are presented in Figures 4, 5, and 6. The general pattern of the results is consistent with total loan response: all types of loans of small banks fall more than large banks. Furthermore, we can notice that investment loans by state banks increase somewhat over the horizon (Figure 4). This also applies to the state banks' working capital loans (Figure 5); the type of loans does not decline at all when the policy is tightened. As far as forex and non-forex banks' loans are concerned, all types of loans are sensitive to monetary shock and the non-forex banks' loans decline more sharply than those of corresponding forex banks, except for investment loans. Again, these result are consistent with our prediction that smaller banks (non-forex) suffer from monetary shock more than larger (forex) banks.

Figure 4.
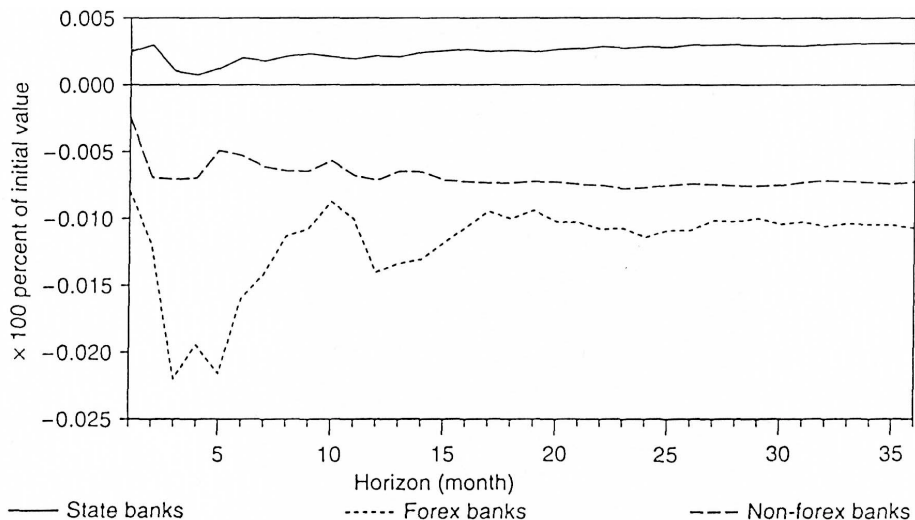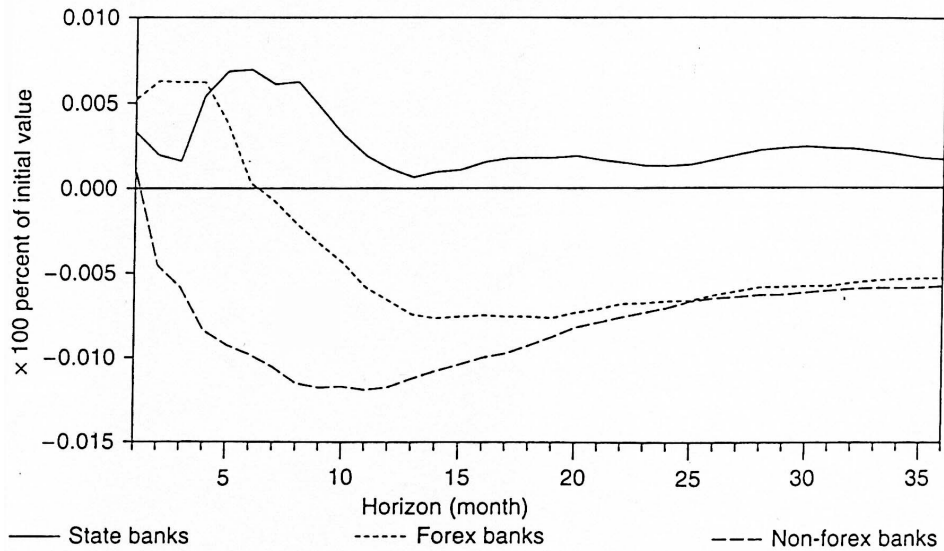**Response of Investment Loans to a Monetary Shock**

Figure 5.
Response of working capital Loans to A Monetary shock

Interestingly, figure 6 indicates that consumer loans for all bank categories, including state banks, decline significantly in the aftermath of monetary policy shock. This is an important point. While investment and working capital loans of state banks do not fall but

**Figure 6**
Response of Consumer Loans to a Monetary Shock
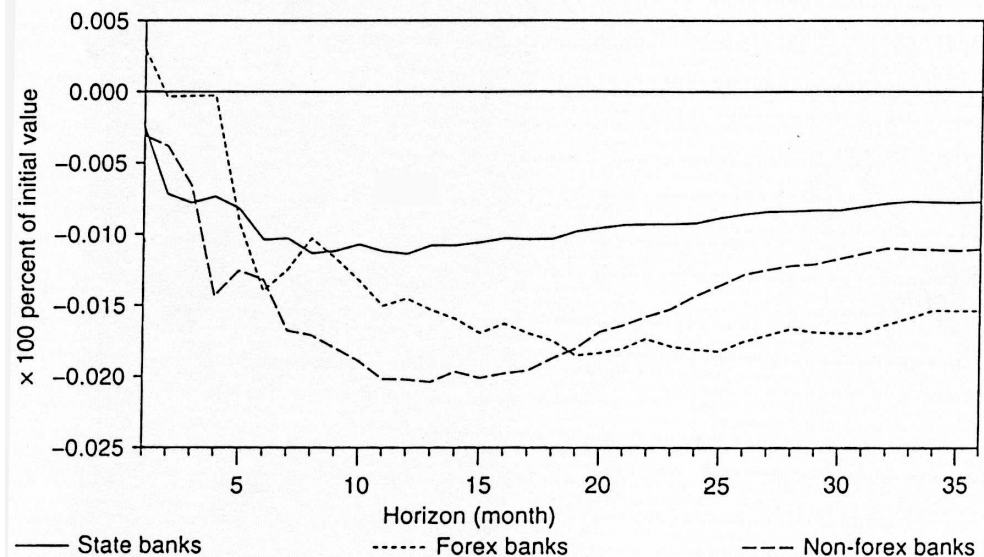
show a significant increase, their consumer loans fall significantly. Given that consumer loans can be attributed to small borrowers, this result supports the view that this class of borrower is most affected by a monetary policy shock. So far we can conclude that a monetary policy shock generates a distributive effect across *both* lenders/banks borrowers as predicted by the bank lending channel or generally by another channel which emphasizes the role of asymmetric information in transmission of monetary policy.

In the Indonesian economy, the sluggish responses of investment loans and working capital loans extended by state banks and some domestic forex banks to monetary shock can be attributed to the relationship between the banks and big business groups. As noted by Nasution (1994, p.134): '...These group of companies enjoy concessionary loans from the state banks... It can be noted that most private banks are closely connected to these same large business conglomerates through ownership networks and interlocking management.........'

Harris et al. (1995) and Nasution (1994) confirm that Indonesian firms associated with conglomerates generally have very high debt-equity ratios. The relationship between banks, financial intermediaries and business groups helps to some extent to reduce information problems, lower the wedge between cost of external and internal funds, and hence improve their access to external finance. In a more recent study on the corporate structure of large firms listed in the stock market, Ang et al. (1997) found that from both survey and econometric results, there was no evidence of asymmetric problems in the firm-bank relationship in Indonesia. Hence, they conclude that '...for larger firms that have long operating histories and thus built up relationships and reputations with their banks and the credit market, asymmetric information diminishes'. Furthermore, from the survey results, they found that large firms manage to negotiate the lending rates and covenants and most of the firms surveyed managed to obtain favourable rates from their banks. The most important finding by Ang et al. (1997) which is quite relevant to our results is that the firms believe that even in periods of tight money, their banks still favour them, resulting in their bank loans being relatively insensitive to a monetary policy change. A survey by Hadad (1996) also confirms that in a period of tight money, Indonesian banks, particularly state banks and foreign banks, tend to prioritize their prime debtor instead of limiting loan expansion.

In other countries, such as Japan and Korea, groups are organically linked with banks. Banks provide a large proportion of financing for business groups (Keiretsu) and sit on the board of directors of the groups. A study by Hoshi et al. (1991) finds that firms that are members of Keiretsu are less sensitive to cash flow than are those unconnected with the business groups. However, in contrast to Japanese Keiretsu, as noted above Indonesian private banks are mostly owned by large business groups. Hence, rather than providing a monitoring role, the banks,

Figure 7
Response of Securities Holdings to a Monetary Shock.
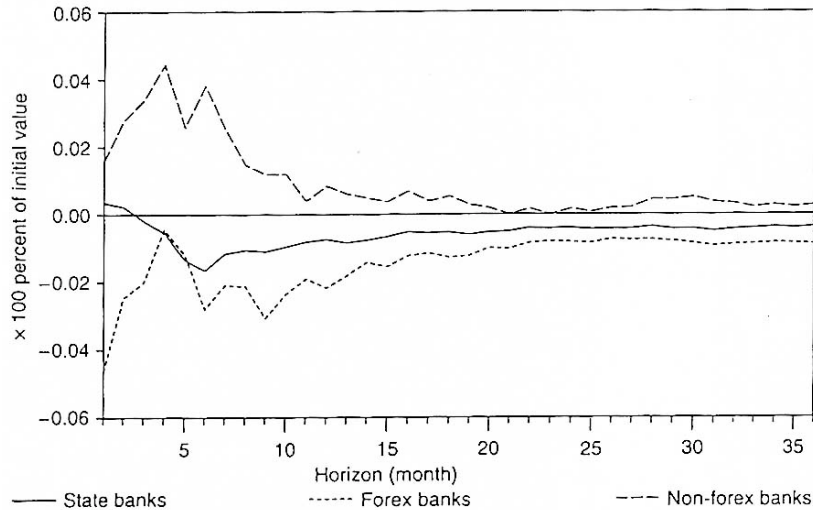
in practice, become the fund-raisers of the groups. In these circumstances, evidence that there is "no asymmetric problem" in the Indonesian bank-company relationship as found by Ang et al. (1997) should be not too surprising.

An alternative interpretation of the results is possible. Bank lending practices in Indonesia, especially by large banks, are mostly conducted on a loan commitment basis, in stead of on a project or fixed-term basis. Under such a commitment, banks allow borrowers to draw down a line of credit at their discretion; and borrowers pay a fee for the credit line and pay interest on actual loans that have been drawn. As a result of this system, banks can not prevent the borrowers from drawing the credit even when monetary conditions are tightened.[20] Furthermore, the loan commitment practice often leads to "evergreen" loans which result in banks facing the problem of having to increase the credit line.[21] Bank are sometimes forced to increase credit lines when they reach their upper limits in order to save the borrowers from financial difficulties, otherwise they have to increase their capital position to cover non-performing loans of the borrower and face financial difficulties in meeting the capital adequacy

[20] In the system, banks in most cases cannot compel the borrowers not to use the credit line to pay the interest rates actual loans.

[21] See Cole and Slade (1996, pp. 120-121) for a detail discussion of this.

[22] This is also exacerbated by the fact that the decision process in state banks was heavily infuenced by political considerations, as suggested by some cases such as loans to the Timor national car project (Linbad, 1997).

requirement. These circumstance create a moral hazard problem for the borrower as the banks implicitly "guarantee" not to force the firms into trouble.[22] Accordingly, it is not surprising that the investment loans and working capital loans of state banks are completely insensitive to monetary tightening.

This is confirmed by the decrease in the securities holding to finance the loan supply in the period of tight money (Figure 7). Holdings of securities by state banks and forex banks drop quickly after the shock. By contrast, non-forex banks increase their securities holdings throughout the horizon. The intuitive explanation of this result is that since small banks face difficulties in seeking

External finance in the aftermath of monetary shock, they tend to be less willing to drop their securities. By contrast, state/large banks which are more confident in raising external funds (foreign borrowing, for example) liquidate their securities after monetary tightening. The liquidation of their securities holdings could be used to maintain their credit commitment to the 'high quality' bank customers. This argument is supported by the fact that the decline in state bank deposits coincides with the decline in their securities holdings (see Figure 2 and 7).

There are two implications of the loan commitment for the bank-lending channel of monetary policy. First, it supports the distributional effect of monetary shock across firms as predicted by bank lending. Firms with loan commitment agreements can access bank loans even when money is tight. The firms increase their borrowing to smooth the effect of declining cash flows as a consequence of monetary tightening. On the other hand, firms without loan commitment have to face credit rationing. Second, if a credit channel exists, the loan commitment may tend to lengthen monetary policy lags, since firm can borrow under a commitmrnt and delay the impact of a monetary contraction.

V. Conclusions

The study has investigated empirically whether there are differential effects of monetary policy on banks' balance sheets across bank categories (state banks, forex banks and non-forex banks) particularly in relation to their deposits, loans and securities and the implications for the existence of the bank lending channel of monetary policy in Indonesia, especially after financial deregulation in the early 1980s. We find significant different responses across the bank-size classes to a change in monetary policy. In particular, a monetary contraction does not significantly influence lending by state banks, but it leads to a decline in lending by smaller banks. A similar pattern emerges when loans are disaggregated into investment and working

capital loans. However, consumer loans of all bank categories drop substantially after the monetary tightening. Thus, the empirical results provide evidence of capital market imperfections for banks.

The results indicate that monetary policy has been unable to restrain lending by the state banks because of thir ability to liquidate their securities following a monetary tightening, and possibly also because of their access to non-deposit funds including foreign borrowing. The sluggish behavior of state bank loans can be attributed to their strong relationship with large business groups, as found by Ang et al. (1997) and also due to loan commitments. In other words, the second condition for the existence of the bank lending channel is undermined. By contrast, the fact that bank lending by smaller banks has been easily constrained by monetary policy provides evidence that the bank lending channel of monetary policy operates through this class of banks. We also found that working capital and consumer loans decline more significantly and quickly than investment loans in the class of non-state banks, suggesting that small loans and loans *not* made under loan commitment tend to be more restrained by monetary policy. The asymmetric effects of monetary policy across *both* lenders and borrowers support the bank lending view of the monetary transmission mechanism in the Indonesian economy. Despite the strong evidence in favour of the bank lending view, further research on differential behavior across non-financial firms' balance sheets, in response to a monetary shock could provide further confirmation for the findings.

Appendix Data: Sources and Construction

Data are monthly from January 1983 to December 1995.

1. Macroeconomic Data

Money market interest rate is the end-of-period 1-month interbank call money rates published in *Weekly report of Bank Indonesia.*

Exchange rate is the end-of-period middle rates of Rp/USD at Bank Indonesia as published in *Indonesian Financial Statistic-Bank Indonesia*

Real GDP: monthly data of the real GDP is interpolated from quarterly real GDP published in *Indonesian Financial statistics, Bank Indonesia.* The interpolation was performed by the piece-wise cubic spline method. For early periods when the quarterly data were not published officially, the data were obtained directly from Indonesian Central Bureau of statistics.

Prices: consumer price index published in Indonesian Financial Statistics-Bank Indonesia.

2. Banks' Balance Sheet Data

Banks' balance sheet data are aggregated from individual bank balance sheets reported by commercial banks to Bank Indonesia. Detailed definitions of each item of the balance sheet are given in Manual for Monthly Report of Commercial Banks in Indonesia (Bank Indonesia, 1995).

Deposits consist of demand deposits, saving deposits and time deposits in both Rupiah and foreign currency, excluded certificate deposits.

Total loans are those extended by commercial banks in both Rupiah and foreign currency.

Working capital loans are those extended for firms' working capital in both Rupiah and foreign currency.

Investment loans are those extended for firms' investment in both Rupiah and foreign currency.

Consumer loans are those extended for consumers such as real estate, automobile or by credit cards.

Securities holdings consist of all securities held by banks in both Rupiah and foreign currency.

Non-deposit funds consists of certificate deposits, securities issued in both Rupiah and foreign currency and direct foreign borrowings.

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